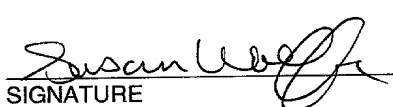


JC19 Rec'd/PCT/PTO 19 JUL 2001

FORM PTO-1350U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE (REV 10-2000) TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371		ATTORNEY'S DOCKET NO 00771.00023 U.S. APPLICATION NO. (If known, See 37 CFR 1.5) 09/889598 TBA
INTERNATIONAL APPLICATION NO PCT/NL00/00036	INTERNATIONAL FILING DATE 18 January 2000	PRIORITY DATE CLAIMED 21 January 1999
TITLE OF INVENTION SECURITY DOCUMENT WITH A PERFORATION PATTERN		
APPLICANT(S) FOR DO/EO/US Johannes I. M. COBBEN et al.		
Applicant herewith submits to the United State Designated/Elected Office (DO/EO/US) the following items and other information:		
<ol style="list-style-type: none"> 1. <input checked="" type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371. 2. <input type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371. 3. <input checked="" type="checkbox"/> This is an express request to promptly begin national examination procedures (35 U.S.C. 371(f)). 4. <input checked="" type="checkbox"/> The US has been elected by the expiration of 19 months from the priority date (PCT Article 31). 5. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371(c)(2)) <ol style="list-style-type: none"> a. <input type="checkbox"/> is attached hereto (required only if not communicated by the International Bureau). b. <input checked="" type="checkbox"/> has been communicated by the International Bureau. c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US). 6. <input checked="" type="checkbox"/> An English language translation of the International Application as filed (35 U.S.C. 371 (c)(2). 7. <input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)) <ol style="list-style-type: none"> a. <input type="checkbox"/> are attached hereto (required only if not communicated by the International Bureau). b. <input type="checkbox"/> have been communicated by the International Bureau. c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired. d. <input checked="" type="checkbox"/> have not been made and will not be made. 8. <input type="checkbox"/> An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)). 9. <input type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)). 10. <input checked="" type="checkbox"/> An English language translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)). 		
Items 11-16 below concern other document(s) or information included:		
<ol style="list-style-type: none"> 11. <input type="checkbox"/> An Information Disclosure Statement under 37 C.F.R. 1.97 and 1.98. 12. <input type="checkbox"/> An Assignment document for recording. A separate cover sheet in compliance with 37 C.F.R. 3.28 and 3.31 is included. 13. <input checked="" type="checkbox"/> A FIRST preliminary amendment. <input type="checkbox"/> A SECOND or SUBSEQUENT preliminary amendment. 14. <input checked="" type="checkbox"/> A substitute specification. The original specification is hereby incorporated by reference in its entirety. 15. <input type="checkbox"/> A change of power of attorney and/or address letter. 16. <input checked="" type="checkbox"/> Other items or information: International Search Report (ISA/EPO) Marked-Up Version of Specification 		

U.S. APPLICATION NO. TBA 09/889598		INTERNATIONAL APPLICATION NO. PCT/NL00/00036		ATTORNEY'S DOCKET NO. 00771.00023	
17. <input checked="" type="checkbox"/> The following fees are submitted: Basic National Fee (37 CFR 1.492(a)(1)-(5)): Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO \$1,000.00 International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO \$860.00 International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.455(a)(2)) paid to USPTO \$710.00 International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4) \$690.00 International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4) \$100.00 ENTER APPROPRIATE BASIC FEE AMOUNT = \$860				CALCULATIONS	PTO USE ONLY
Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)).				\$0	
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total Claims	25 -20 =	5	X \$18.00	\$90	
Independent Claims	6 -3 =	3	X \$ 80.00	\$240	
Multiple dependent claims (if applicable)			X \$270.00	\$0	
TOTAL OF ABOVE CALCULATIONS =				\$1190	
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. The fees indicated below above are reduced by 1/2.				\$0	
SUBTOTAL =				\$1190	
Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)).				\$0	
TOTAL NATIONAL FEE =				\$1190	
Fee for recording the enclosed assignment (37 CFR 1.21(h). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property.				\$0	
TOTAL FEES ENCLOSED =				\$1190	
+				Amount to be:	\$
				refunded	\$
a. <input type="checkbox"/> A check in the amount of \$_____ to cover the above fees is enclosed. b. <input checked="" type="checkbox"/> Please charge my Deposit Account No. 19-0733 in the amount of <u>\$1190</u> to cover the above fees. A duplicate copy of this sheet is enclosed. c. <input type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 19-0733. A duplicate copy of this sheet is enclosed.					
NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.					
SEND ALL CORRESPONDENCE TO: Banner & Witcoff, Ltd. Eleventh Floor 1001 G Street, N.W. Washington, D.C. 20001-4597 Telephone: (202) 508-9100				 SIGNATURE Susan A. Wolffe Registration No. 33,568 Date: July 19, 2001	

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:

Johannes I. M. COBBEN et al.

Serial No.: TBA

Filed: Herewith (July 19, 2001)

For: SECURITY DOCUMENT WITH A
PERFORATION PATTERN

Atty. Dkt. No.: 00771.00023

U.S. National Stage of

International Application No.:

PCT/NL00/00036

PRELIMINARY AMENDMENT

BOX PCT

Commissioner for Patents

Washington, D. C. 20231

Sir:

Prior to examination and calculation of any claim fees, please amend the instant application as follows:

IN THE ABSTRACT:

Insert the following Abstract, which is also annexed hereto on a separate sheet:

ABSTRACT OF THE DISCLOSURE

The invention relates to a forge-proof document comprising a security feature in the form of a perforation pattern which displays gray tones when viewed against a bright background, wherein the document is manufactured from a material which transmits light to a limited extent, at least some of the perforations forming part of the perforation pattern extend over only a part of the thickness of the document at the position of the perforation, and the thickness of the remaining part of the document at the position of the perforation is modulated in accordance with the image to be displayed. The invention also relates to such a document comprising a security feature in the form of a perforation pattern which displays gray tones when viewed against a bright background, wherein at least some of the perforations forming part of the perforation pattern extend at an angle differing from 90° relative to the main plane of the document.

IN THE SPECIFICATION:

Please replace the specification with the attached substitute specification which is in the preferred form, corrects several typographical and grammatical errors and inserts section headings. The original specification is hereby incorporated by reference in its entirety. A marked up version of the specification is also attached showing the amendments made.

IN THE CLAIMS:

Please cancel claims 1-25 and insert the following new claims 26-50 therefor:

26. (NEW) Forge-proof document comprising a security feature in the form of a perforation pattern which displays gray tones when viewed against a bright background wherein the document is manufactured from a material which transmits light to a limited extent, that at least some of the perforations forming part of the perforation pattern extend over only a part of the thickness of the document at the position of the perforation, and that the thickness of the remaining part of the document at the position of the perforation is modulated in accordance with the image to be displayed.
27. (NEW) Forge-proof document comprising a security feature in the form of a perforation pattern which displays gray tones when viewed against a bright background wherein at least some of the perforations forming part of the perforation pattern extend at an angle differing from 90° relative to the main plane of the document.
28. (NEW) Document as claimed in claim 27 wherein the angle is modulated in order to obtain the image.
29. (NEW) Document as claimed in claim 27 wherein the density or the diameter of the perforation is modulated in order to obtain the image.
30. (NEW) Document as claimed in claim 26 wherein the perforation represents an image.

31. (NEW) Forge-proof document comprising a security feature in the form of a perforation pattern which represents an image and which displays gray tones when viewed against a bright background wherein material is arranged in the perforations.
32. (NEW) Document as claimed in claim 31 wherein the material is formed by ink which lights up under UV light.
33. (NEW) Document as claimed in claim 31 wherein a vapor-deposited metal layer is arranged in the perforations.
34. (NEW) Document as claimed in claim 31 wherein the document comprises differently colored material layers, wherein a color is visible depending on the depth of the perforation.
35. (NEW) Document as claimed in claim 34 wherein the document is manufactured from plastic laminate and that the core layer has a color differing from the other layers.
36. (NEW) Document as claimed in claim 31 wherein the perforation pattern is further provided with perforations modulated in density or size.
37. (NEW) Document as claimed in claim 31 wherein the perforation pattern is provided locally with a perforation pattern differing from the rest of the perforation pattern.
38. (NEW) Document as claimed in claim 28 wherein the perforation pattern is adapted to present a stereo image to the observer from a viewing position.
39. (NEW) Document as claimed in claim 28 wherein the perforation pattern is adapted to present to the user an image which differs per angle of view.

40. (NEW) Document as claimed in claim 39 wherein the angle of the perforations to the main plane of the document increase as the distance to the center of the perforation pattern increases.

41. (NEW) Document as claimed in claim 31 wherein the cross-section of the perforation pattern in its transverse plane is unequal to a circle.

42. (NEW) Document as claimed in claim 31 wherein a code is concealed in the representation of an image.

43. (NEW) Document as claimed in claim 31 wherein an intermediate layer with an ink is arranged in the carrier.

44. (NEW) Document as claimed in claim 43 wherein the ink is only visible ink in UV light.

45. (NEW) Document as claimed in claim 31 wherein the perforation is arranged in a protected element mounted on the carrier, such as an optically variable element.

46. (NEW) Document as claimed in claim 31 wherein the image represented by the perforation pattern corresponds with an image applied by means of graphic techniques, laser engraving technique or a photo, characterized in that both images coincide.

47. (NEW) Document as claimed in claim 46 wherein the images are personalized.

48. (NEW) Method for arranging a perforation pattern in a forge-proof document comprising a security feature in the form of a perforation pattern which displays gray tones when viewed against a bright background, the method comprising the following steps:

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arranging the document to be provided of a perforation pattern in a position in which it can be irradiated by a laser source; and

irradiating the document by a laser source which is controlled to obtain a first image in the document wherein:

amending the relative position of the document and the laser source; and

subsequently irradiating the document by said laser source which is controlled to obtain a second image.

49. (NEW) Method for arranging a perforation pattern in a forge-proof document comprising a security feature in the form of a perforation pattern which displays gray tones when viewed against a bright background, the method comprising the following steps:

arranging the document to be provided of a perforation pattern in a position in which it can be irradiated by a laser source; and

irradiating the document by a laser source which is controlled to obtain a first image in the document wherein:

the laser source is programmed to apply a perforation pattern comprising perforations of which the cross-section in the transverse plane of the perforation pattern is unequal to a circle.

50. (NEW) Method for arranging a perforation pattern in a forge-proof document comprising a security feature in the form of a perforation pattern which displays gray tones when viewed against a bright background, the method comprising the following steps:

applying a foil on the document to be provided of a perforation pattern;

arranging the document in a position in which it can be irradiated by a laser source; and

irradiating the document by a laser source which is controlled to obtain a first image in the document wherein:

subsequently the document is subjected to a vapor deposition process; and

finally the foil is removed from the document.

REMARKS

By this amendment, an Abstract has been inserted, the specification has been amended and Applicant has included a substitute specification, and the original claims 1-25 have been canceled and replaced by new claims 26-50 in order to eliminate multiple dependencies and place the claims in better form for examination. Examination on the merits of the instant application is respectfully requested.

Annexed hereto is a marked-up version of the amendments made in the instant amendment.

Respectfully submitted,

[Signature]
Susan A. IV-166-

Susan A. Wolffe
Reg. No. 33,568

Date: July 19, 2001

Banner & Witcoff, Ltd.
1001 G Street, N.W.
Washington, D. C. 20001-4597
(202) 508-9100

Attachment:

1. Marked-Up Version of Specification
2. Substitute Specification
3. Abstract of the Disclosure

FDW:SAW:lab

[illegible][illegible]

1 prtg

SECURITY DOCUMENT WITH A PERFORATION PATTERN

FIELD OF THE INVENTION

- [01] The present invention relates to a forge-proof document comprising a security feature in the form of a perforation pattern which displays gray tones when viewed against a bright background.

BACKGROUND OF THE INVENTION

- [02] Such a document is known from W098/19869.
- [03] Although the prior art document in question provides a very good security against forgery, it is important to develop new security features in respect of the technical potential of forgers.

BRIEF DESCRIPTION OF THE INVENTION

- [04] For this purpose, the present invention provides the measure that the document is manufactured from a material which transmits light to a limited extent, that the perforation extends over only a part of the thickness of the document at the position of the perforation, and that the thickness of the remaining part of the document at the position of the perforation is modulated in accordance with the image to be displayed.
- [05] This measure results in a further degree of difficulty; the determining factor for displaying the gray tone of the perforation, and therewith the image, is determined by the remaining thickness of the document. This means that the depth of the non-continuous perforation must be determined very precisely. The resulting thickness is after all the difference between two larger values, i.e., the thickness of the total document and the depth of the perforation.
- [06] According to another independent measure according to the invention, the perforation extends at an angle differing from 90° relative to the main plane of the document. This has the result that the perforation cannot be arranged with very small drills, but

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that use will have to be made of a laser which, on the one hand, requires a large investment and, on the other, requires a high degree of technical knowledge.

- [07] This method of arranging provides the option of modulating the angle so as to obtain a gray-value modulation.
- [08] There is moreover the possibility, as in the classic straight perforations, of modulating the density of the perforation or the size, i.e., the diameter, thereof.
- [09] The perforation is preferably an image.
- [10] It is herein noted that the image as arranged by means of perforation can be subjected to a certain degree of image-processing. It is hereby possible to compensate the features of the image lost due to the necessary quantization. An example of such an image-processing is "contour enhancement."
- [11] The invention is also applicable to perforation patterns which do not represent an image, but which represent an alphanumeric expression or a code.
- [12] It will be apparent that a combination of these possibilities can be applied. Such an oblique perforation can of course be combined with a normal straight perforation. This combination provides the option of introducing an extra pattern. The main image, which is modulated in order to display gray tones, is for instance arranged herein with a straight perforation, while an additional feature, for instance in the form of a logo or letters, is arranged obliquely. The choice of the angle or other properties of the oblique perforation can be chosen such that during normal observation of the pattern at an angle of about 90° the normal image appears, and that during observation at another angle the second image in the form of a logo or a letter combination becomes visible.
- [13] Another example is the arranging of two images at the same position on the carrier, although at different angles such that each eye sees its own image, and a stereo image is thus observed.
- [14] It will be apparent that this can be varied in numerous ways.

such a document is processed with mechanical means, a degree of smearing will occur.

- [22] This smearing can be observed particularly well when the ink is formed by ink sensitive in UV light.
- [23] According to another embodiment, perforations arranged in a carrier in a pattern representing an image are filled with an ink which lights up under UV light. Such a pattern becomes visible if it is illuminated with a UV light source.
- [24] In another embodiment, the inner sides of the perforations of such a pattern are provided with a layer, for instance by vapor-deposition of a reflecting metal layer, resulting in an image which is visible when viewed. Selective application of a layer to the inner side of all perforations is possible by arranging a removable foil before the perforations are arranged and removing it after said layer has been applied.
- [25] In another embodiment, the starting point is a carrier which is built up of material layers of different colors. By modulating the depth, the perforation can be made to end in the desired layer and thereby make a desired color visible. An image in color can thus be realized.
- [26] The invention further provides the option of arranging the perforation in a protected element mounted on the carrier, such as an optically variable element such as a hologram or a kinegram. Such security features are not accessible to a forger, since they are only transacted between one manufacturer and one buyer. By furthermore providing such a security feature with a personalized perforation pattern, the forger is also deprived of the possibility of transferring such an element from one document to another.
- [27] When the image represented by the perforation pattern corresponds with another image arranged on the document, it is possible to have the images coincide. This provides the option of having both images coincide precisely. This has as advantages: the problems for the forger and counterfeiter increase, verification becomes even faster and simpler, and no extra surface area is required for the perforated image.

BRIEF DESCRIPTION OF THE DRAWINGS

- [28] The present invention will be elucidated hereinbelow with reference to the annexed drawings, in which:
- [29] figure 1 shows a cross-sectional view of a first embodiment of a document according to the present invention;
- [30] figure 2 shows a cross-sectional view of a second embodiment of a document according to the present invention;
- [31] figure 3 shows a cross-sectional view of a third embodiment of a document according to the present invention;
- [32] figure 4 is a cross-sectional view of a fourth embodiment of a document according to the present invention;
- [33] figure 5 is a cross-sectional view of a fifth embodiment of a document according to the present invention;
- [34] figure 6 shows a schematic perspective detail view of a sixth embodiment of the invention;
- [35] figure 7 is a schematic perspective detail view of a seventh embodiment of the invention;
- [36] figure 8 is a cross-sectional view of an eighth embodiment of the invention, which also serves to elucidate the method used therein; and
- [37] figure 9 shows a cross-sectional view of a ninth embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

- [38] Figure 1 shows a cross-section of a document 1. Document 1 is manufactured from plastic but can likewise be manufactured from another material, such as paper, textile,

and it can also be manufactured from laminated material, wherein a combination of diverse material types is made.

- [39] As elucidated in the international patent application with publication number W098/19869, such a document is provided with perforations. In figure 1, the perforations 2 have been arranged. In this first embodiment of the present invention, perforations 2 do not extend through the whole thickness of document 1, but leave a part 3 of the document intact.
- [40] The remaining parts 3 of the diverse perforations are herein of differing thickness. They therefore transmit light to a greater or lesser extent and, when the document is held against the light, an image comprising gray tones will result subject to the thickness of the remaining part 3 and the depth of perforation 2.
- [41] According to an embodiment as shown in figure 2, the perforations are arranged obliquely, i.e., at an angle differing from 90° relative to the main plane of the document. It is herein possible to obtain a modulation of the gray tones by varying the relevant angle. This is elucidated with dotted lines in figure 2.
- [42] It is further possible, as shown in figure 3, to modulate the width, i.e., the diameter of holes 4. It is of course possible here to combine both forms of modulation. It is moreover possible to combine one of the two modulation forms or both of them with modulation of the density of the perforations.
- [43] It is of course possible to assign determined properties to such a combination of modulation methods. An example hereof is shown in figure 4.
- [44] When the document is viewed straight on, as indicated with dotted lines in figure 3, a similar gray tone is herein displayed for each of the perforations. This gray tone can be modulated by varying the density or by varying the size of the perforations. It is herein possible according to the invention to generate an image.
- [45] Owing to the fact that both perforations 4 are arranged obliquely, it is possible to provide these perforations with extra information, for instance by arranging them in

the form of a letter or a logo. This is of course only visible when the image is viewed at a determined angle.

- [46] In the embodiment shown in figure 5, a perforation in the form of a cone or in the form of a truncated cone is obtained in both cases. Modulation of the visible gray tone can herein be obtained by varying the "depth" of the cone or its apex angle. Thus, this forms a combination of depth of hole modulation and diameter of hole modulation. Perforation 10 is thus, for instance, continuous, while perforation 11 is blind.
- [47] It is further possible, as shown in figure 6, to arrange a perforation in a form differing from a circle, for instance a rectangle 6. The rectangular perforation can be difficult to obtain with mechanical means, so that a laser is necessary for this purpose. A laser beam can after all be controlled such that it causes a perforation with such a contour, provided the focusing is sufficiently fine. It will be apparent that other shapes are possible, such as triangles, squares, ovals and so on.
- [48] Figure 7 shows a configuration wherein this document is provided with layer 7 provided with ink. This layer is not particularly noticeable when the perforation is arranged with a laser; this layer is also removed by the laser. When an attempt is made to provide such a document with a perforation by means of mechanical means, for instance drilling, the ink will smear, which is clearly visible.
- [49] Such a configuration can also be applied to laminated cards, the inner layer of which has a color, for instance white, which differs from the colors of the other layers.
- [50] Figure 8 shows how it is possible, using the same laser light source 8, to provide the same document 1 in different positions with a straight perforation 5 and subsequently with an oblique perforation 4. It is of course essential herein that the laser light beam 9 leaving laser source 8 can be deflected sufficiently. In addition, accurate stops and the like are necessary for the required precision in the positioning of document 2 in the different positions. It will be apparent that it is possible to perforate the document from more than two positions.

[51] Finally, figure 9 shows an embodiment wherein laser light source 8 is placed relatively close to document 1, so that as a result of the angular deviation there result perforations which extend at a different angle. It will further be apparent that it is possible within the scope of the present invention to vary in countless ways from the shown embodiments.

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SECURITY DOCUMENT WITH A PERFORATION PATTERN

FIELD OF THE INVENTION

The present invention relates to a forge-proof document comprising a security feature in the form of a perforation pattern which displays greygray tones when viewed against a bright background.

BACKGROUND OF THE INVENTION

Such a document is known from W098/19869.

Although the prior art document in question provides a very good security against forgery, it is important to develop new security features in respect of the technical potential of forgers.

BRIEF DESCRIPTION OF THE INVENTION

For this purpose, the present invention provides the measure that the document is manufactured from a material which transmits light to a limited extent, that the perforation extends over only a part of the thickness of the document at the position of the perforation, and that the thickness of the remaining part of the document at the position of the perforation is modulated in accordance with the image to be displayed.

This measure results in a further degree of difficulty; the determining factor for displaying the greygray tone of the perforation, and therewith the image, is determined by the remaining thickness of the document. This means that the depth of the non-continuous perforation must be determined very precisely. The resulting thickness is after all the difference between two larger values, i.e., the thickness of the total document and the depth of the perforation.

According to another independent measure according to the invention, the perforation extends at an angle differing from 90° relative to the main plane of the document. This has the result that the perforation cannot be arranged with very small drills, but that use will have to be made of a laser, which, on the one hand, requires a large investment and, on the other, requires a high degree of technical knowledge.

This method of arranging provides the option of modulating the angle so as to obtain a greygray-value modulation.

There is moreover the possibility, as in the classic straight perforations, of modulating the density of the perforation or the size, i.e., the diameter, thereof.

The perforation is preferably an image.

the laser spot. It is, in any case, practically impossible to obtain this with mechanical means in view of the fineness of the required pattern.

According to another preferred embodiment, a code is concealed in the representation of the image. Use can be made herein of the teachings already applied in graphic techniques, according to which it is possible to arrange changes in an image which are not visible to the normal eye and which result after a specific processing in a code being displayed.

Conversely, an immediately visible coding can also be chosen. The code can be used, for instance, to identify the machine on which the relevant product was made. The relevant machine can thus be identified in the case of improper use of a machine.

According to yet another embodiment, an intermediate layer is arranged in the document, which layer is provided with an ink.

The use of laser provides the possibility of complete removal, i.e., burning, evaporating and so on, of the material from which the document is manufactured. Contamination of the relevant layers of the document will herein hardly occur. When such a document is processed with mechanical means, a degree of smearing will occur.

This smearing can be observed particularly well when the ink is formed by ink sensitive in UV light.

According to another embodiment, perforations arranged in a carrier in a pattern representing an image are filled with an ink which lights up under UV light. Such a pattern becomes visible if it is illuminated with a UV light source.

In another embodiment, the inner sides of the perforations of such a pattern are provided with a layer, for instance by ~~vapour~~vapor-deposition of a reflecting metal layer, resulting in an image which is visible when viewed. Selective application of a layer to the inner side of all perforations is possible by arranging a removable foil before the perforations are arranged and removing it after said layer has been applied.

In another embodiment, the starting point is a carrier which is built up of material layers of different ~~couleurs~~colors. By modulating the depth, the perforation can be made to end in the desired layer and thereby make a desired ~~couleur~~color visible. An image in ~~couleur~~color can thus be realized.

The invention further provides the option of arranging the perforation in a protected element mounted on the carrier, such as an optically variable element such as a hologram or a kinegram. Such security features are not accessible to a forger, since they are only transacted

between one manufacturer and one buyer. By furthermore providing such a security feature with a personalized perforation pattern, the forger is also deprived of the possibility of transferring such an element from one document to another.

When the image represented by the perforation pattern corresponds with another image arranged on the document, it is possible to have the images coincide. This provides the option of having both images coincide precisely. This has as advantages: the problems for the forger and counterfeiter increase, verification becomes even faster and simpler, and no extra surface area is required for the perforated image.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be elucidated hereinbelow with reference to the annexed drawings, in which:

figure 1 shows a cross-sectional view of a first embodiment of a document according to the present invention;

figure 2 shows a cross-sectional view of a second embodiment of a document according to the present invention;

figure 3 shows a cross-sectional view of a third embodiment of a document according to the present invention;

figure 4 is a cross-sectional view of a fourth embodiment of a document according to the present invention;

figure 5 is a cross-sectional view of a fifth embodiment of a document according to the present invention;

figure 6 shows a schematic perspective detail view of a sixth embodiment of the invention;

figure 7 is a schematic perspective detail view of a seventh embodiment of the invention;

figure 8 is a cross-sectional view of an eighth embodiment of the invention, which also serves to elucidate the method used therein; and

figure 9 shows a cross-sectional view of a ninth embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Figure 1 shows a cross-section of a document 1. Document 1 is manufactured from plastic but can likewise be manufactured from another material, such as paper, textile, and it

can also be manufactured from laminated material, wherein a combination of diverse material types is made.

As elucidated in the international patent application with publication number W098/19869, such a document is provided with perforations. In figure 1, the perforations 2 have been arranged. In this first embodiment of the present invention, perforations 2 do not extend through the whole thickness of document 1, but leave a part 3 of the document intact.

The remaining parts 3 of the diverse perforations are herein of differing thickness. They therefore transmit light to a greater or lesser extent and, when the document is held against the light, an image comprising greygray tones will result subject to the thickness of the remaining part 3 and the depth of perforation 2.

According to an embodiment as shown in figure 2, the perforations are arranged obliquely, i.e., at an angle differing from 90° relative to the main plane of the document. It is herein possible to obtain a modulation of the greygray tones by varying the relevant angle. This is elucidated with dotted lines in figure 2.

It is further possible, as shown in figure 3, to modulate the width, i.e., the diameter of holes 4. It is of course possible here to combine both forms of modulation. It is moreover possible to combine one of the two modulation forms or both of them with modulation of the density of the perforations.

It is of course possible to assign determined properties to such a combination of modulation methods. An example hereof is shown in figure 4.

When the document is viewed straight on, as indicated with dotted lines in figure 3, a similar greygray tone is herein displayed for each of the perforations. This greygray tone can be modulated by varying the density or by varying the size of the perforations. It is herein possible according to the invention to generate an image.

Owing to the fact that both perforations 4 are arranged obliquely, it is possible to provide these perforations with extra information, for instance by arranging them in the form of a letter or a logo. This is of course only visible when the image is viewed at a determined angle.

In the embodiment shown in figure 5, a perforation in the form of a cone or in the form of a truncated cone is obtained in both cases. Modulation of the visible greygray tone can herein be obtained by varying the "depth" of the cone or its apex angle. Thus, this This

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SECURITY DOCUMENT WITH A PERFORATION PATTERN

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The present invention relates to a forge-proof document comprising a security feature in the form of a perforation pattern which displays grey tones when viewed against a bright background.

10

Such a document is known from WO98/19869.

Although the prior art document in question provides a very good security against forgery, it is important to develop new security features in respect of the technical potential of forgers.

15

For this purpose the present invention provides the measure that the document is manufactured from a material which transmits light to a limited extent, that the perforation extends over only a part of the thickness of the document at the position of the perforation, and that the thickness of the remaining part of the document at the position of the perforation is modulated in accordance with the image to be displayed.

20

This measure results in a further degree of difficulty; the determining factor for displaying the grey tone of the perforation, and therewith the image, is determined by the remaining thickness of the document. This means that the depth of the non-continuous perforation must be determined very precisely. The resulting thickness is after all the difference between two larger values, i.e. the thickness of the total document and the depth of the perforation.

30

According to another independent measure according to the invention, the perforation extends at an angle differing from 90° relative to the main plane of the document. This has the result that the perforation cannot be arranged with very small drills, but that use will have to be made of a laser, which on the one hand

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requires a large investment and on the other requires a high degree of technical knowledge.

This method of arranging provides the option of modulating the angle so as to obtain a grey-value 5 modulation.

There is moreover the possibility, as in the classic straight perforations, of modulating the density of the perforation or the size, i.e. the diameter, thereof.

10 The perforation is preferably an image.

It is herein noted that the image as arranged by means of perforation can be subjected to a certain degree of image-processing. It is hereby possible to compensate the features of the image lost due to the
15 necessary quantization. An example of such an image-processing is "contour enhancement".

The invention is also applicable to perforation patterns which do not represent an image, but which represent an alphanumeric expression or a code.

20 It will be apparent that a combination of these possibilities can be applied. Such an oblique perforation can of course be combined with a normal straight perforation. This combination provides the option of introducing an extra pattern. The main image, which is
25 modulated in order to display grey tones, is for instance arranged herein with a straight perforation, while an additional feature, for instance in the form of a logo or letters, is arranged obliquely. The choice of the angle or other properties of the oblique perforation can be
30 chosen such that during normal observation of the pattern at an angle of about 90° the normal image appears, and that during observation at another angle the second image in the form of a logo or a letter combination becomes visible.

35 Another example is the arranging of two images at the same position on the carrier, although at different angles such that each eye sees its own image, and a stereo image is thus observed.

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It will be apparent that this can be varied in numerous ways.

It is attractive herein to make use of a method wherein the document to be protected is irradiated by a laser source from two positions. It is of course possible herein to make use of two laser sources, although it is of course simpler to first irradiate the document in a first position with a laser source at a first angle and to then place the document in a different position wherein it is irradiated by the same laser source at a different angle.

When the laser source is placed close to document, it is also possible to arrange a perforation at an angle differing from 90° ; this is caused by the cone or pyramid shape inside which the laser light beam must displace in order to arrange the perforation. A pattern then results which has an increasing angle as the distance to the centre of the image increases.

According to another preferred embodiment of the invention the cross-section of the perforation in its transverse plane is unequal to a circle. The use of a laser source provides the possibility of performing such a perforation when there is a correct control of the positions of the laser spot. It is in any case practically impossible to obtain this with mechanical means in view of the fineness of the required pattern.

According to another preferred embodiment a code is concealed in the representation of the image. Use can be made herein of the teachings already applied in graphic techniques, according to which it is possible to arrange changes in an image which are not visible to the normal eye and which result after a specific processing in a code being displayed.

Conversely, an immediately visible coding can also be chosen. The code can be used for instance to identify the machine on which the relevant product was made. The relevant machine can thus be identified in the case of improper use of a machine.

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According to yet another embodiment an intermediate layer is arranged in the document, which layer is provided with an ink.

10 This smearing can be observed particularly well
when the ink is formed by ink sensitive in UV light.

In another embodiment the inner sides of the perforations of such a pattern are provided with a layer, for instance by vapour-deposition of a reflecting metal layer, resulting in an image which is visible when viewed. Selective application of a layer to the inner side of all perforations is possible by arranging a removable foil before the perforations are arranged and removing it after said layer has been applied.

The invention further provides the option of arranging the perforation in a protected element mounted on the carrier, such as an optically variable element such as a hologram or a kinegram. Such security features
35 are not accessible to a forger, since they are only transacted between one manufacturer and one buyer. By furthermore providing such a security feature with a personalized perforation pattern, the forger is also

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deprived of the possibility of transferring such an element from one document to another.

The present invention will be elucidated hereinbelow with reference to the annexed drawings, in which:

figure 2 shows a cross-sectional view of a second embodiment of a document according to the present invention;

figure 4 is a cross-sectional view of a fourth embodiment of a document according to the present invention;

figure 5 is a cross-sectional view of a fifth embodiment of a document according to the present invention:

figure 7 is a schematic perspective detail view of a seventh embodiment of the invention;

figure 8 is a cross-sectional view of an eighth embodiment of the invention, which also serves to elucidate the method used therein; and

figure 9 shows a cross-sectional view of a ninth embodiment of the present invention.

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Figure 1 shows a cross-section of a document 1. Document 1 is manufactured from plastic but can likewise be manufactured from another material, such as paper, textile, and it can also be manufactured from laminated material, wherein a combination of diverse material types is made.

As elucidated in the international patent application with publication number WO98/19869, such a document is provided with perforations. In figure 1 the perforations 2 have been arranged. In this first embodiment of the present invention perforations 2 do not extend through the whole thickness of document 1 but leave a part 3 of the document intact.

The remaining parts 3 of the diverse perforations are herein of differing thickness. They therefore transmit light to a greater or lesser extent and, when the document is held against the light, an image comprising grey tones will result subject to the thickness of the remaining part 3 and the depth of perforation 2.

According to an embodiment as shown in figure 2, the perforations are arranged obliquely, i.e. at an angle differing from 90° relative to the main plane of the document. It is herein possible to obtain a modulation of the grey tones by varying the relevant angle. This is elucidated with dotted lines in figure 2.

It is further possible as shown in figure 3 to modulate the width, i.e. the diameter of holes 4. It is of course possible here to combine both forms of modulation. It is moreover possible to combine one of the two modulation forms or both of them with modulation of the density of the perforations.

It is of course possible to assign determined properties to such a combination of modulation methods. An example hereof is shown in figure 4.

When the document is viewed straight on, as indicated with dotted lines in figure 3, a similar grey tone is herein displayed for each of the perforations.

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This grey tone can be modulated by varying the density or by varying the size of the perforations. It is herein possible according to the invention to generate an image.

Owing to the fact that both perforations 4 are
5 arranged obliquely, it is possible to provide these
perforations with extra information, for instance by
arranging them in the form of a letter or a logo. This is
of course only visible when the image is viewed at a
determined angle.

10 In the embodiment shown in figure 5 a perforation in the form of a cone or in the form of a truncated cone is obtained in both cases. Modulation of the visible grey tone can herein be obtained by varying the "depth" of the cone or its apex angle. This thus
15 forms a combination of depth of hole modulation and diameter of hole modulation. Perforation 10 is thus for instance continuous, while perforation 11 is blind.

It is further possible, as shown in figure 6, to arrange a perforation in a form differing from a circle, for instance a rectangle 6. The rectangular perforation can be difficult to obtain with mechanical means, so that a laser is necessary for this purpose. A laser beam can after all be controlled such that it causes a perforation with such a contour, provided the focussing is sufficiently fine. It will be apparent that other shapes are possible, such as triangles, squares, ovals and so on.

Figure 7 shows a configuration wherein this document is provided with layer 7 provided with ink. This layer is not particularly noticeable when the perforation is arranged with a laser; this layer is also removed by the laser. When an attempt is made to provide such a document with a perforation by means of mechanical means, for instance drilling, the ink will smear, which is clearly visible.

Such a configuration can also be applied to laminated cards, the inner layer of which has a colour,

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for instance white, which differs from the colours of the other layers.

Figure 8 shows how it is possible, using the same laser light source 8, to provide the same document 1 in different positions with a straight perforation 5 and subsequently with an oblique perforation 4. It is of course essential herein that the laser light beam 9 leaving laser source 8 can be deflected sufficiently. In addition, accurate stops and the like are necessary for the required precision in the positioning of document 2 in the different positions. It will be apparent that it is possible to perforate the document from more than two positions.

Finally, figure 9 shows an embodiment wherein laser light source 8 is placed relatively close to document 1, so that as a result of the angular deviation there result perforations which extend at a different angle. It will further be apparent that it is possible within the scope of the present invention to vary in countless ways from the shown embodiments.

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CLAIMS

1. Forge-proof document comprising a security
5 feature in the form of a perforation pattern which
displays grey tones when viewed against a bright
background, **characterized in that** the document is
manufactured from a material which transmits light to a
limited extent, that at least some of the perforations
10 forming part of the perforation pattern extend over only
a part of the thickness of the document at the position
of the perforation, and that the thickness of the
remaining part of the document at the position of the
perforation is modulated in accordance with the image to
15 be displayed.

2. Forge-proof document comprising a security
feature in the form of a perforation pattern which
displays grey tones when viewed against a bright
background, **characterized in that** at least some of the
20 perforations forming part of the perforation pattern
extend at an angle differing from 90° relative to the
main plane of the document.

3. Document as claimed in claim 2,
characterized in that the angle is modulated in order to
25 obtain the image.

4. Document as claimed in claim 2 or 3,
characterized in that the density or the diameter of the
perforation is modulated in order to obtain the image.

5. Document as claimed in any of the foregoing
30 claims, **characterized in that** the perforation represents
an image.

6. Forge-proof document comprising a security
feature in the form of a perforation pattern which
represents an image and which displays grey tones when
35 viewed against a bright background, **characterized in that**
material is arranged in the perforations.

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35 16. Document as claimed in any of the foregoing claims, characterized in that the cross-section of the perforation pattern in its transverse plane is unequal to a circle.

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17. Document as claimed in any of the foregoing claims, characterized in that a code is concealed in the representation of an image.

18. Document as claimed in any of the foregoing
5 claims, characterized in that an intermediate layer with
an ink is arranged in the carrier.

19. Document as claimed in claim 18,
characterized in that the ink is only visible ink in UV
light

10 20. Document as claimed in any of the foregoing
claims, characterized in that the perforation is arranged
in a protected element mounted on the carrier, such as an
optically variable element.

21. Document as claimed in any of the foregoing
15 claims, wherein the image represented by the perforation
pattern corresponds with an image applied by means of
graphic techniques, laser engraving technique or a photo,
characterized in that both images coincide.

22. Document as claimed in claim 21,
20 characterized in that the images are personalized.

23. Method for arranging a perforation pattern in a document as claimed in claim 3 or any of the claims dependent on claim 3, wherein the perforations are arranged by a laser, **characterized in that** the document is processed in at least two different positions by a laser source.

24. Method for arranging a perforation pattern in a document as claimed in claim 16, characterized in that the document is processed in a single position from a single laser source.

25. Method for arranging a perforation pattern in a document as claimed in claim 9, characterized in that a layer is first arranged on the document, the perforation is subsequently arranged, the document is then subjected to a vapour deposition process and finally the foil is removed.

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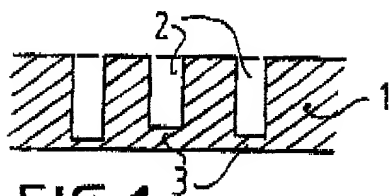


FIG. 1

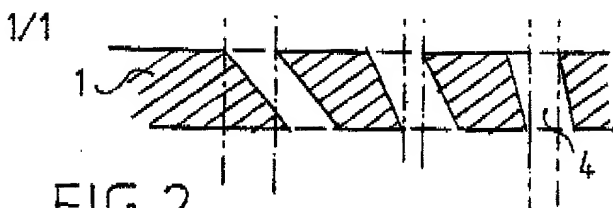


FIG. 2

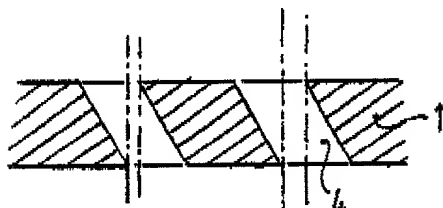


FIG. 3

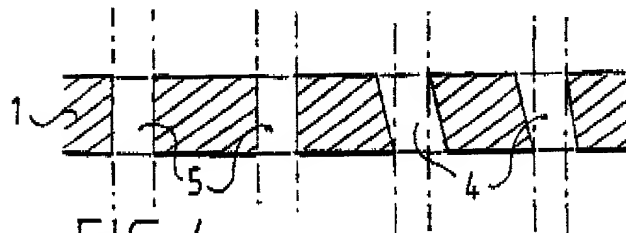


FIG. 4



FIG. 5

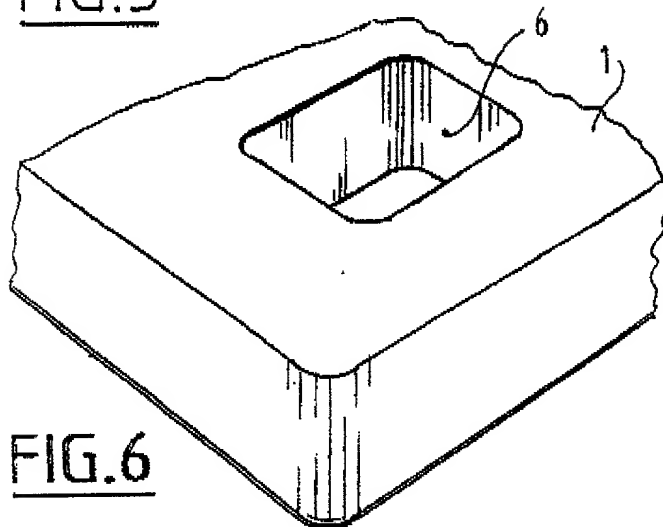


FIG. 6

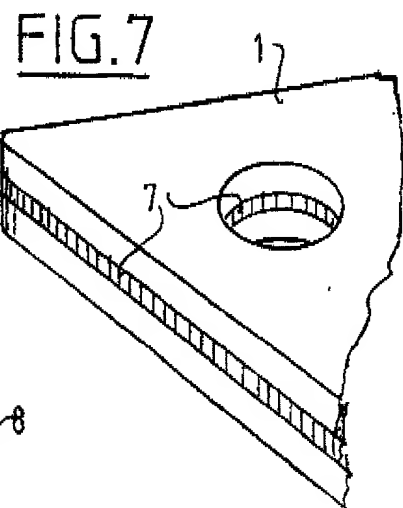


FIG. 7

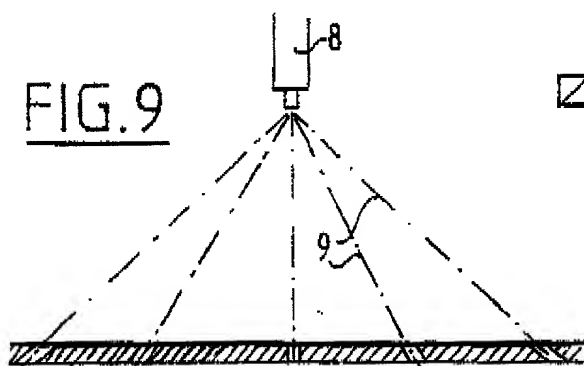


FIG. 9

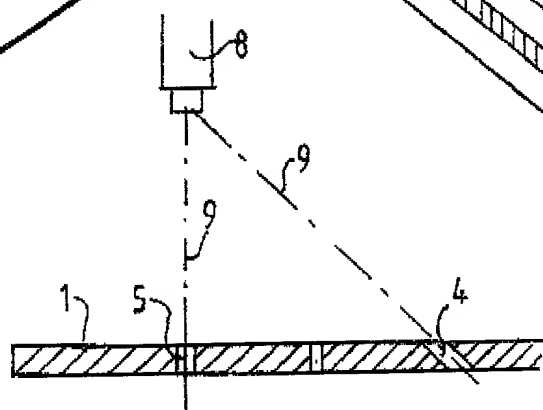
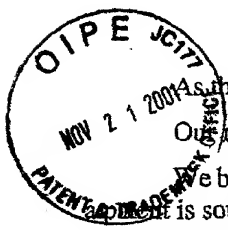


FIG. 8

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JOINT DECLARATION FOR PATENT APPLICATION



As the below named inventors, we hereby declare that:

Our residence, post office address and citizenship are as stated below next to our names;

We believe we are the original, first and joint inventors of the subject matter which is claimed and for which protection is sought on the invention entitled SECURITY DOCUMENT WITH A PERFORATION PATTERN, the specification of which

- ☐ is attached hereto.
- ☒ was filed on July 19, 2001 as Application Serial Number 09/889,598 and was amended on July 19, 2001 (if applicable).
- ☒ was filed under the Patent Cooperation Treaty (PCT) and accorded International Application No. PCT/NL00/00036, filed January 18, 2000, and amended on March 1, 2001 (if any).

We hereby state that we have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

We hereby acknowledge the duty to disclose information which is material to patentability in accordance with Title 37, Code of Federal Regulations, 1.56(a).

Prior Foreign Application(s)

We hereby claim foreign priority benefits under Title 35, United States Code, 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application(s) for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Country	Application No.	Date of Filing (day month year)	Date of Issue (day month year)	Priority Claimed Under 35 U.S.C. 119
Netherlands ✓	1011103 ✓	21 January 1999 ✓		yes
Netherlands ✓	1012460 ✓	28 June 1999 ✓		yes

Prior United States Provisional Application(s)

We hereby claim priority benefits under Title 35, United States Code, 119(e)(1) of any U.S. provisional application listed below:

U.S. Provisional Application No.	Date of Filing (day month year)	Priority Claimed Under 35 U.S.C. 119(e)(1)

Prior United States Application(s)

We hereby claim the benefit under Title 35, United States Code, 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, 112, we acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

Application Serial No.	Date of Filing (Day, Month, Year)	Status: Patented, Pending, Abandoned


Power of Attorney

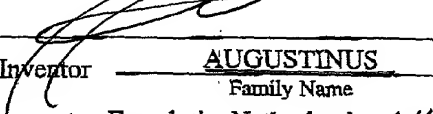
And we hereby appoint, both jointly and severally, as my attorneys, all Banner & Witcoff, Ltd. attorneys indicated therein under PTO Customer Number #22907 with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office.

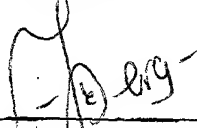
All correspondence and telephone communications should be addressed to:

Banner & Witcoff, Ltd.
Customer Number: 22907 (WDC)

We hereby declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

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